THE CONTRIBUTION OF ARIZONA STATE UNIVERSITY TO THE ARIZONA ECONOMY, FISCAL YEAR 2005

A Report from the Office of the University Economist

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF CHARTS

SUMMARY

One approach to measuring the contribution of a university to a local economy is to trace the effects on local jobs and incomes of the full range of spending events triggered by the university, e.g., its payroll and non-payroll expenses and the spending of students and visitors. In fiscal year (FY) 2005, Arizona State University (ASU) employed 17,500 faculty, staff and students and had a total payroll of $660 million. The university indirectly generated another 4,100 Arizona jobs and earnings of $220 million when it spent $620 million ($475 million of which was spent in state) on construction projects, equipment, and other goods and services associated with university operations. Out-of-state visitors to ASU and university-sponsored events spent $35 million in the local economy supporting 600 jobs and producing more than $10 million in earnings. Yet another round of economic impacts arises from the consumer spending of faculty, staff and students. A total of 11,700 in-state jobs with earnings of $380 million were supported by purchases of goods and services by ASU faculty, staff and students.

The above-mentioned spending events create ripple or multiplier effects within the state's economy when the firms supplying goods and services to the university community place upstream demands on other producers, when the employees of these firms make additional purchases themselves, and when state and local governments in Arizona spend additional tax revenues. The multiplier effects themselves amount to 17,700 jobs and earnings of $660 million. When all economic interdependencies are accounted for, the spending of the ASU community was responsible for 51,600 Arizona jobs and earnings of $1.9 billion in FY 2005.

An alternative approach to measuring the economic value of a university is to focus on the higher productivity and earnings of its graduates. The connection between education and earnings is unmistakable. Nationwide data for 2003, for example, show that male workers between ages 35 and 44 earn 85 percent more if they have completed college than if they have only a high school degree. For women in the same age group, the college earnings premium is 76 percent.

The costs of attending college include tuition and fees paid by the student, state funds used to support higher education and, most significant in size, lost earnings during the time the student is in school. The benefits of a college education greatly outweigh the costs, however. The present value of the additional lifetime earnings made possible by an undergraduate education exceeds the total costs by a margin of $274,000 for a male student and $207,000 for a female student. In the language of finance, the inflation-adjusted internal rate of return to a college education is 13 percent for both men and women.

Because higher education has such a dramatic effect on an individual's lifetime earnings, total income in the state of Arizona is $1.4 billion higher because of the undergraduate education services provided by ASU over the past three decades.

INTRODUCTION

This report provides an assessment for fiscal year 2005 of the contribution of Arizona State University to the Arizona economy. The economic effects of the university are measured using two different approaches. The traditional approach is to view a university like a business. ASU is a force in the local economy because it is a major employer of Arizona workers and because the university community at large, including students, spends hundreds of millions of dollars each year on local goods and services.

An alternative approach to assessing the economic value of a university is to focus on the higher productivity and earnings that are made possible because of the knowledge and skills students acquire in school. This report demonstrates that higher education is a high-yield investment. The benefits of education, as reflected in the higher earnings students receive after they graduate, greatly outweigh the costs.

ASU AS A BUSINESS

Arizona State University directly contributes to the state's economy by employing 17,500 faculty, staff, and students and by spending $620 million annually on equipment, supplies, and other goods and services. Less obvious but no less significant are the indirect economic impacts that arise from the consumer spending of faculty, staff, and students. These primary impacts then induce secondary or multiplier effects when the firms that supply goods and services to the university community place upstream demands on other producers, when the employees of these firms make additional purchases themselves, and when state and local governments in Arizona spend additional tax revenues.

An analysis of the full range of economic impacts associated with the spending of Arizona State University was conducted using an Arizona-specific version of IMPLAN, an input-output model used widely by researchers throughout the United States. Effects referred to as "primary" are IMPLAN estimates of the direct economic impact of purchases of goods and services by the university and its financially interrelated units and consumer expenditures made by ASU faculty, staff, students and visitors. Effects referred to as "secondary" are IMPLAN estimates of the indirect and induced economic impact of these spending events.

Chart 1 provides a summary of results and an overview of the economic impact methodology. Charts 2 and 3 detail the effects Arizona State University has on employment and earnings in the state. Unless otherwise indicated, statistics refer to fiscal year 2005 and measure the combined impacts of all three campuses—ASU Tempe, ASU West, and ASU Polytechnic.

University Expenditures

Arizona State University directly affects the economy of Arizona by employing more than 17,500 people on either a full-time or part-time basis. During the 2004-05 academic year, the university employed approximately 2,500 faculty, 7,500 administrative and classified staff, and 7,500 graduate and undergraduate students. The university payroll for FY 2005 was $660 million, with wages and salaries accounting for $545 million and the remainder representing employee-related expenses.

CHART 1
SUMMARY OF THE ECONOMIC IMPACT OF ARIZONA STATE UNIVERSITY, FISCAL YEAR 2005
(Dollar Values in Millions)

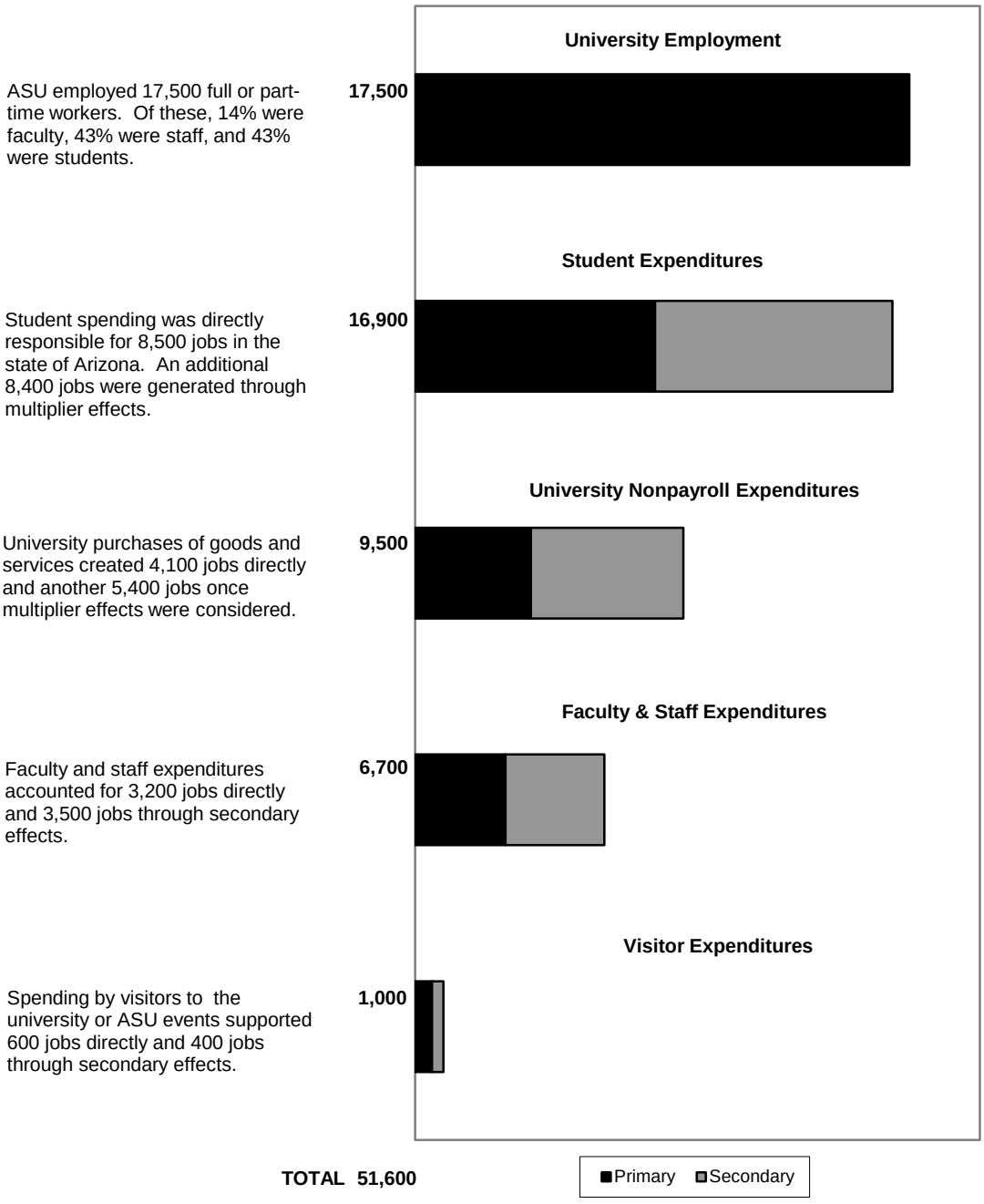
PRIMARY ECONOMIC IMPACT			
DIRECT IMPACTS		**INDIRECT IMPACTS**	
University jobs	17,500	In-state jobs	16,400
University payroll	$660	In-state earnings	$610
University non-payroll expenditures	$475	Spending by ASU faculty, staff & students	$1,100
Visitor expenditures	$35		

SECONDARY ECONOMIC IMPACT	
Jobs	17,700
Earnings	$660
Spending	$1,650

TOTAL ECONOMIC IMPACT	
Jobs	51,600
Earnings	$1,930
Spending	$3,260

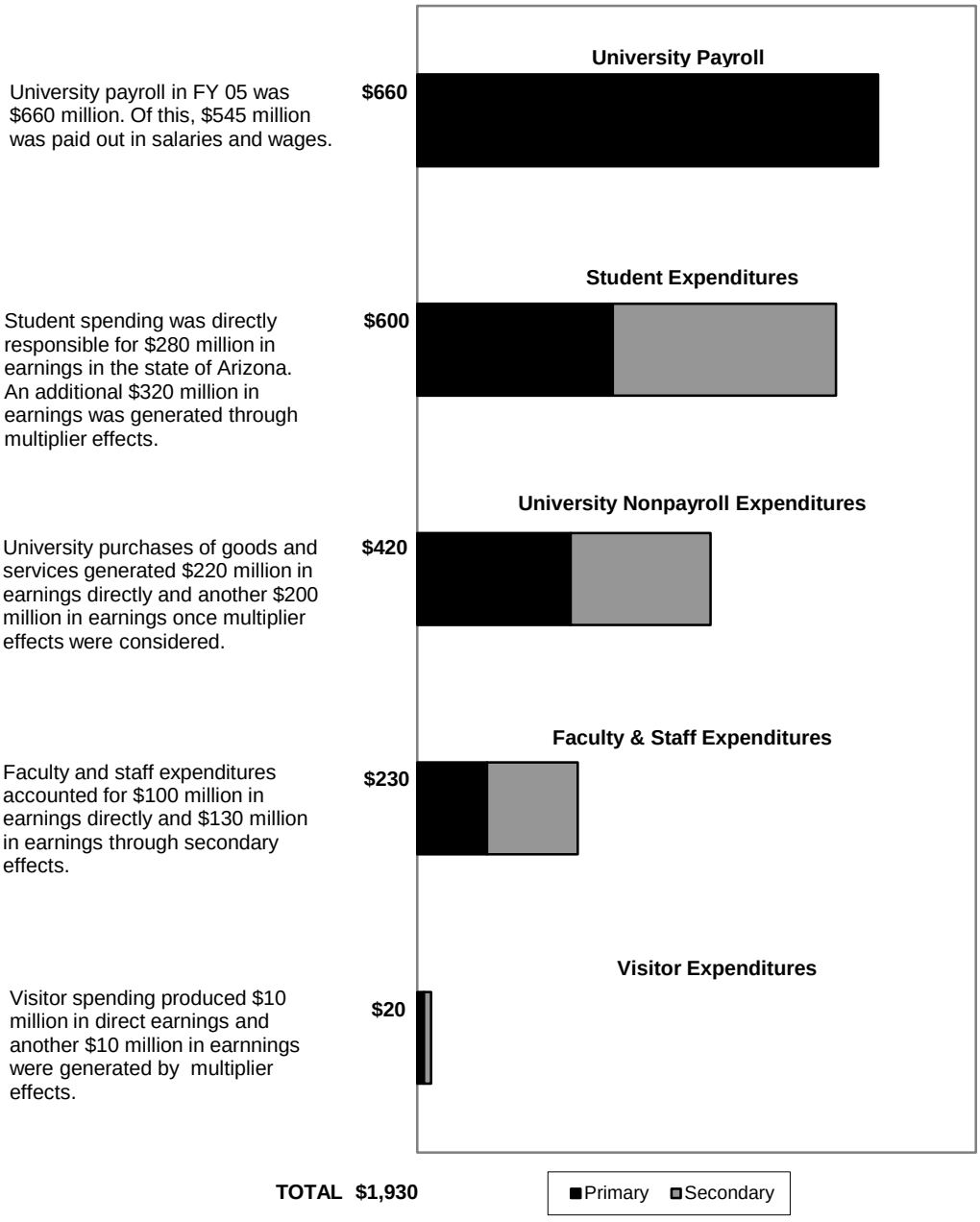
Source: Center for Competitiveness and Prosperity Research, L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University.

CHART 2
IMPACT OF ASU ON STATE EMPLOYMENT, FISCAL YEAR 2005
(Number of Full- or Part-Time Jobs)



Source: Center for Competitiveness and Prosperity Research, L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University.

CHART 3
IMPACT OF ASU ON STATE EARNINGS, FISCAL YEAR 2005
(Millions of Dollars)



Source: Center for Competitiveness and Prosperity Research, L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University.

Another way in which ASU directly affects the economy is by purchasing goods and services that are necessary for university operations. Non-payroll expenditures in FY 2005 totaled $620 million, creating demand for $475 million in goods and services supplied by Arizona businesses. These purchases directly accounted for 4,100 jobs and $220 million in earnings for Arizona households.

University purchases induce secondary or so-called multiplier effects in an economy. These effects occur when immediate suppliers of ASU products purchase intermediate goods and services from upstream suppliers and when all affected suppliers hire additional employees who, in turn, make consumer purchases and pay taxes that support local government spending programs. The secondary effects of ASU non-payroll expenditures were estimated to be 5,400 jobs and $200 million in earnings. The total impact of university purchases was 9,500 jobs and earnings of $420 million in FY 2005.

Employee Spending

Arizona State University faculty and staff contribute to the state's economy not only by helping to provide education and other university services, but also by consuming products supplied by Arizona businesses. Estimates of spending by faculty and staff were made by combining ASU payroll data with information from the U.S. Bureau of Labor Statistics on the share of income spent on individual commodity items by U.S. households. This approach attributes to the university only that household spending financed by income earned at ASU. Consumer expenditures associated with the payroll of ASU faculty and staff were estimated to be $445 million in FY 2005. Of this total, $295 million was spent on goods and services produced by Arizona businesses. This spending was directly responsible for 3,200 jobs and $100 million in earnings in the state.

As with institutional expenditures, consumer spending generates secondary or multiplier effects throughout an economy. Spending by ASU faculty and staff had a secondary impact on the Arizona economy of 3,500 jobs and $130 million in earnings. In total, expenditures by ASU faculty and staff accounted for 6,700 jobs and earnings of $230 million in FY 2005.

Student Spending

An average of 56,600 students were enrolled at Arizona State University during the fall and spring semesters of the 2004-05 academic year. Because of their sheer number, ASU students exert an enormous influence on the local economy. Estimates of student spending were made by combining enrollment figures with estimates of per capita spending obtained in a student survey conducted in the fall of 1991 by the Walter Cronkite School of Journalism at ASU. The survey numbers were escalated to allow for inflation and a moderate amount of growth in real spending. Average monthly expenditures per student in 2005 were estimated to be approximately $1,800.

The ASU student population was directly responsible for more than $1 billion worth of spending, excluding tuition. Approximately $800 million worth of goods and services purchased by student spending were produced in Arizona. The direct impact on Arizona was 8,500 jobs and $280 million in earnings.

The secondary effect of student expenditures was an additional 8,400 jobs and earnings of $320 million. The total economic impact of spending by the ASU student population was 16,900 jobs and $600 million in earnings.

Visitor Expenditures

Athletic events, cultural activities, conferences, and other programs draw large numbers of visitors to Arizona State University each year. In addition, parents and friends visit students, and prospective students and their families make evaluation visits to the campus. Many of those who attend ASU activities are local residents. But it is estimated that out-of-town visitors spend more than 200,000 visitor-days in the Phoenix area because of university-related activities. These visitors spend $35 million on locally produced goods and services. This spending can directly account for 600 jobs in the state. When multiplier effects are added in, visitor spending has a total economic impact of $60 million in sales and 1,000 jobs.

Total Economic Impact

The total impact of Arizona State University on spending in the state is estimated to have been $3.2 billion in 2005. The total employment impact of ASU, including university employees and all other jobs indirectly induced, was 51,600 jobs. The total earnings associated with these jobs were estimated to be $1.9 billion. Much of the economic impact generated by university activities result from grants, gifts, and student and visitor spending financed from sources other than the State of Arizona. The university community serves to leverage each dollar of state appropriations into nearly $6 of earnings accruing to Arizona households and more than $9 of sales within the Arizona economy.

ASU AS A PROVIDER OF HIGHER EDUCATION

Arizona State University sponsors and supports a diverse set of activities that directly benefit the community, including pure and applied research, cultural events, and other public service activities. But the primary mission of the university is to provide quality education for its students. The economic value of a college education is reflected in the earnings premium realized by workers with college degrees.

Degrees Awarded

Arizona State University is a major provider of collegiate education services. The university awarded a total of 12,821 degrees (9,729 undergraduate and 3,092 graduate degrees) during the 2004-05 academic year. This is up from 5,067 degrees awarded in 1970-71 and 7,939 degrees during 1990-91.

Earnings Premium for College Graduates

A college education provides important non-monetary benefits to a student — enhanced social skills, greater awareness of human achievement, and an appreciation for cultural diversity. But college is increasingly viewed as an investment in what economists call “human capital” — the acquisition of knowledge and skills that are valued by employers and which provide a means of increasing future earnings.

One can gain a sense of magnitude of the economic value of higher education by examining information from the U.S. Bureau of the Census on earnings of individuals by level of

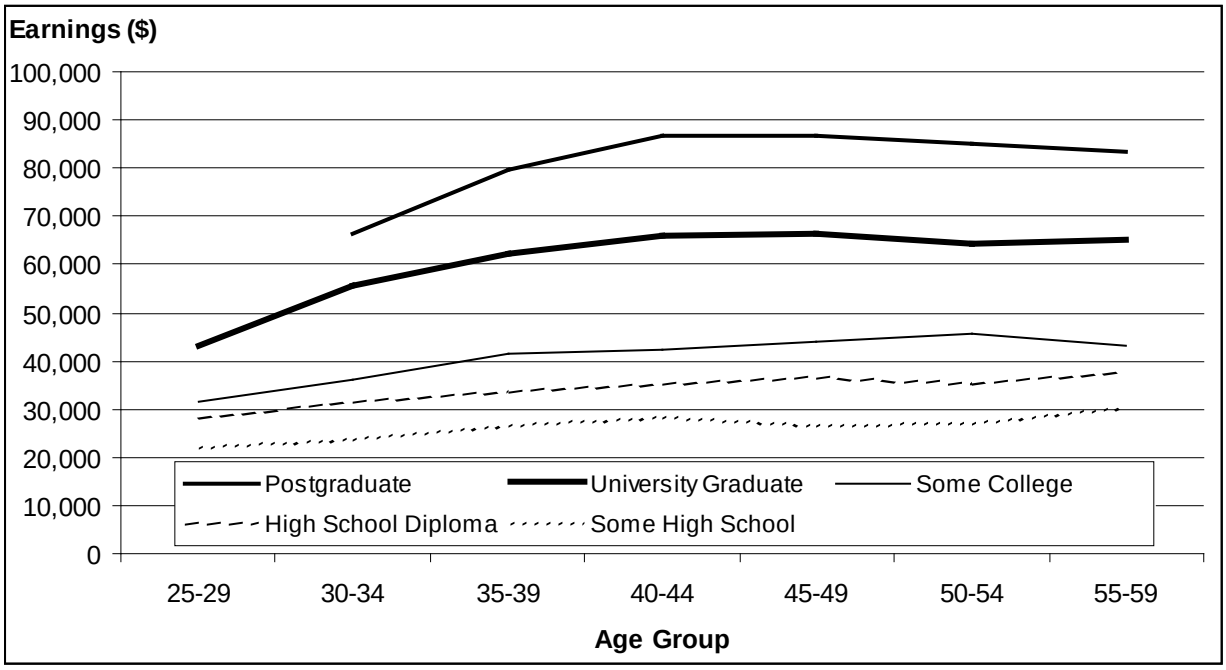
educational attainment. The most recent information is from the 2003 Current Population Survey and is available by age and sex, as well as educational attainment. The data are national in coverage and include people who have been educated at schools throughout the country and are employed across all fifty states. More specific information on earnings by education for the state of Arizona is too limited to be reliable.

Using recent earnings information for workers of different ages, Chart 4 shows the unmistakable connection between education and earnings. People who have completed high school earn more than those who have not; people with some college earn more than those that did not attend college; those who have earned a bachelor's degree earn more than those with a partial college education; and those with graduate education earn more than those with only an undergraduate degree.

The earnings premium to a college education is substantial. Male workers between ages 35 and 44 earn on average 85 percent more if they have completed college than if they have only a high school degree. A college education also enhances the earnings power of women. Female workers between ages 35 and 44 earn 76 percent more with a bachelor's degree.

The earnings premium to higher education has been increasing since the early 1980s, when the premium was approximately 40 percent for both men and women between the ages of 35 and 44.

CHART 4
MEAN ANNUAL EARNINGS BY AGE AND EDUCATIONAL ATTAINMENT
IN THE UNITED STATES
Full-time, Year-Round Workers, 2002-03



Source: U.S. Department of Commerce, Census Bureau, Current Population Survey.

This trend seems to reflect a broad-based increase in the demand for skilled workers that is occurring throughout the industrialized world. A rising skill premium is evident not only in the earnings of educated workers but also in the earnings of those with work experience and skills acquired on the job. Labor market economists attribute the rise in the education/skills premium to several factors: skill-using technological advances (especially involving the computer), increased trade with less-developed countries, and a decline in the importance of unions and wage-setting institutions in some countries. Although the high return to schooling should eventually lead to a greater supply of educated workers, the consensus opinion of experts is that the demand for skilled workers will continue to grow and the return to education will remain high into the foreseeable future.

College as an Investment

A formal cost-benefit analysis of the investment value of a four-year college education is provided in Table 1. The costs of going to college include tuition and fees paid by the student, state funds used to support higher education and, most importantly, lost earnings during the time the student is attending college. The direct costs for education (tuition, fees, and books) at Arizona State University are approximately $4,900 per student per year. State funds received by ASU to help defray the costs of education are about $6,000 per student per year. The foregone earnings of ASU male students are estimated to be approximately $18,200 per year, and the foregone earnings of female students are estimated at $14,800 per year. (These figures reflect an assumption that while attending college, students work only during the summer. To the extent that students are able to work part-time during the semester, and remain effective in their studies,

TABLE 1
VALUE OF A BACHELOR'S DEGREE
Based on Mean Earnings of Full-Time, Year-Round Workers in the United States in 2002-03 (Expressed in 2005 Dollars)

	Men	Women
Costs (Ages 18 to 21):		
Direct Cost of Education	$19,500	$19,500
State Appropriations	23,800	23,800
Foregone Earnings	72,900	59,100
Total Costs	116,200	102,400
Total Costs Discounted at 5 Percent Real Interest	108,100	95,400
Benefits (Ages 22 to 65):		
Earnings with a High School Diploma	1,800,000	1,284,000
Earnings with a Four-Year Degree	3,110,000	2,267,000
Differential in Earnings	1,310,000	983,000
Earnings Differential Discounted at 5 Percent Real Interest	382,500	302,800
Net Present Value of a Bachelor's Degree	274,400	207,400
Internal Rate of Return	13%	13%

Note: See the text for explanations of the calculations.

Source: Center for Competitiveness and Prosperity Research, L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University, using data from the U.S. Department of Commerce, Census Bureau.

the analysis overstates costs and understates the net benefits of a college education.) For the entire four-year period, the total costs of attending college amount to $116,200 for men and $102,400 for women.

In the absence of specific information on the earnings performance of ASU graduates, the benefits of having an ASU undergraduate degree are estimated by calculating the difference between the mean earnings of a U.S. worker of a given age and sex who holds a bachelor's degree (and no more) and the mean earnings of a worker with the same demographic characteristics who has only completed high school. The estimated earnings differential is then reduced by 7 percent to reflect the general earnings experience of workers in Arizona. (The average wage in Arizona is 7 percent less than the national average.) Using this approach and assuming that a college graduate works continuously from age 22 to 65, the additional earnings provided by a college education are $1,310,000 for men and $983,000 for women.

When comparing streams of expenses and incomes that accrue over time, it is necessary to "discount" figures to a common base year. The present value of receiving $10,000 ten years from now is significantly less than $10,000 — not just because of inflation, but because of the time value of money. If the annual rate of interest is 5 percent, then $10,000 to be received in ten years has a present value of $6,139 in the sense that a present period investment of $6,139 at 5 percent interest would be worth precisely $10,000 in ten years' time.

If future expenses are discounted to the present using an inflation-adjusted interest rate of 5 percent, the costs of attending college amount to $108,100 for men and $95,400 for women. Discounting has a more dramatic effect on the present value of future earnings. The present value of the incremental earnings afforded by a college education is $382,500 for a male graduate and $302,800 for a female graduate.

Thus the benefits of a college education decidedly outweigh the costs. The net present value of a college education is $274,400 for men and $207,400 for women. From an alternative perspective, the inflation-adjusted internal rate of return to a college education is 13 percent for both men and women.

Contribution of ASU Undergraduate Education to Arizona Income

Because higher education has such a dramatic effect on an individual's lifetime earnings, total income in the state of Arizona is significantly higher because of the education received by Arizona State University students over the past several decades. This conclusion does not necessarily follow from the earlier demonstration that college is a sound investment for an individual. Many ASU graduates end up leaving the state. Also, because of steady growth in the university's student population, currently there are more students incurring costs, such as foregone personal income and taxpayer support, than there are former graduates in any four-year cohort. Nevertheless, simple calculations demonstrate that Arizona's annual net income is now more than $1.4 billion higher because of the education services provided by the university. Table 2 provides a summary of these calculations.

In the absence of more specific information, it has been assumed that ASU graduates working in the state receive a college earnings premium equal to the nationwide average premium for

TABLE 2
CONTRIBUTION OF ASU UNDERGRADUATE EDUCATION TO ARIZONA INCOME, FISCAL YEAR 2005

	Value per Student	Number of Students	Subtotal**	Total**
Incremental Earnings of ASU Undergraduates***				$2,484
Costs				1,040
Lost income	$16,394	35,889*	$588	
Tuition, fees and books	4,886	35,889*	175	
State appropriations	5,938	46,670	277	
Net Effect on Arizona Income				1,444

* Arizona residents only
** In millions
*** Graduates between 1970 and 2004, assuming that 53 percent remain in Arizona

Source: Center for Competitiveness and Prosperity Research, L. William Seidman Research Institute, W. P. Carey School of Business, Arizona State University, using data from the U.S. Department of Commerce, Census Bureau.

workers of the same age and sex (less 7 percent in recognition of the fact that Arizona workers generally earn less than U.S. workers). Those who graduated in the 1970s and are now in their fifties are on average earning $23,000 (women) to $37,000 (men) more than they would have had they only completed high school. Similarly, those graduating in the 1990s, who are in their late twenties and thirties, earn on average between $20,000 and $25,000 more because of their undergraduate education. Recent alumni records indicate that approximately 53 percent of ASU graduates now reside in the state of Arizona. Combining this figure with the total number of undergraduate degrees awarded to men and women from 1970 to 2004, the gross impact of ASU undergraduate education on current Arizona income can be estimated. The estimates indicate that income in the state is now $2.5 billion higher because of the education services provided by the university over the past 35 years.

To estimate the net effect of ASU education on current state income, some allowance must be made for the costs incurred by students now attending ASU. There are approximately 47,000 undergraduates enrolled at the university, and roughly three-quarters of these are considered state residents. Combining these figures with the average costs per student results in an estimate of slightly more than $1 billion for the total cost to Arizona of ASU's present undergraduate population. Thus, the net effect of ASU undergraduate education on current income in the state of Arizona is approximately $1.4 billion.

CONCLUDING REMARKS

This analysis of the contribution of Arizona State University to the Arizona economy has focused on the impact of the university community as an employer and purchaser of goods and services and as a provider of higher education. These are not the only benefits that ASU generates for the local economy. Technology created through cooperative programs with

industry raises the competitiveness of local firms. And the presence of a faculty respected for its research accomplishments serves as a catalyst for economic development activities. These broader economic contributions are not easily measured but they are no less valuable to the state of Arizona.